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The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 23

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Ex parte CHRISTOPHER HUGH STROLLE

Appeal No. 2002-1376
Application 08/869,589[1]

ON BRIEF

Before THOMAS, BARRETT, and DIXON, Administrative Patent Judges.

BARRETT, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal under 35 U.S.C. § 134 from the final rejection of claims 1, 9, 10, 12, 15, and 16. Claims 2-8, 13, and 14 are objected to and claim 11 has been allowed.

We affirm.

[1] Application for patent filed June 5, 1997, entitled "Method and Apparatus for Performing Bandedge Equalization," which is based on and claims priority under 35 U.S.C. § 119(e)(1) from U.S. Provisional Application 60/019,308, filed June 7, 1996.

BACKGROUND

The invention relates to a method and apparatus for performing equalization of the amplitudes of the bandedges of a broadband signal. Asymmetric bandedges cause timing jitter in the timing recovery circuitry.

Claim 1 is reproduced below.

1. Apparatus for equalizing the amplitudes of the bandedges of a broadband signal comprising:

a pre-equalizer for adjusting the amplitudes of the bandedges of said broadband signal in response to a control signal;

a bandedge filter, connected to said pre-equalizer, for extracting a bandedge signal from said broadband signal; and

a bandedge signal processor, connected to said bandedge filter, for generating said control signal in response to said bandedge signal.

The examiner relies on the following reference:

Norrell et al. (Norrell)	5,793,821	August 11, 1998 (filed June 7, 1995)

Claims 1, 9, 10, 12, 15, and 16 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Norrell.

We refer to the final rejection (Paper No. 13) (pages referred to as "FR__") and the examiner's answer (Paper No. 19) (pages referred to as "EA__") for a statement of the examiner's rejection, and to the brief (Paper No. 18) (pages referred to as "Br__") and reply brief (Paper No. 20) (pages referred to as "RBr__") for a statement of appellant's arguments thereagainst.

OPINION

Claims 1 and 12

The examiner finds that: (1) "a pre-equalizer for adjusting the amplitudes of the bandedges of said broadband signal in response to a control signal" (claim 1) and the step of "adjusting the amplitudes of the bandedges of said broadband signal in response to a control signal" (claim 12) correspond to the structure and function of the timing interpolation filter (TIF) 504 and the receiver equalizer sample delay line 506 in Fig. 5 of Norrell (EA5; EA8), where the "control signal" is the set of coefficients from the coefficient computation unit 530 to the TIF 504; (2) "a bandedge filter, connected to said pre-equalizer, for extracting a bandedge signal from said broadband signal" (claim 1) and the step of "extracting a bandedge signal from said broadband signal" (claim 12) correspond to the structure and function of the bandedge filters 508, 512 in Fig. 5 (EA5; EA8); and (3) "a bandedge signal processor, connected to said bandedge filter, for generating said control signal in response to said bandedge signal" (claim 1) and the step of "generating said control signal in response to said bandedge signal" (claim 12) correspond to the structure and function of elements 518-530 in Fig. 5 (EA6; EA9), again where the "control signal" is the set of coefficients from the coefficient computation unit 530.

Appellant argues only that Norrell does not teach the claimed "pre-equalizer" (claim 1) and the corresponding step of "adjusting the amplitudes of the bandedges of said broadband signal in response to a control signal" (claim 12). There is no dispute that bandedge filters 508 and 512 extract bandedge signals and that elements 518-530 are connected to the bandedge filters and produce a control signal.

The examiner refers to the following statement in Norrell (col. 9, lines 11-15): "This filtering technique [of the invention] is superior to simple amplitude equalization of the channel prior to extraction of the timing envelope, because equalization boosts the desired energy at the bandedges, but also boosts the unwanted energy near the bandedges." (Emphasis added.) The examiner finds that this suggests equalizing for adjusting the amplitude of the bandedges even though it is not used in Norrell's invention (FR2). The examiner also refers to the following statement in Norrell (col. 9, lines 44-48): "[I]f the delay line is long enough to compensate for amplitude and delay distortion in general, it is long enough to compensate for the differential delay distortion at a particular pair of frequencies." (Emphasis added.) The examiner finds that this teaches compensating for amplitude distortion in the channel in the equalizer sample delay line 506 and, since the entire signal

is compensated for amplitude distortion, the amplitude of the bandedges are compensated for amplitude distortion (EA9).

Appellant argues that elements 504 and 506 merely compensate for differential delay distortion between the upper and lower bandedges, referring to column 7, lines 65-67, and is devoid of any teaching of adjusting amplitudes of bandedges (Br8-9). It is argued that column 9, lines 11-15, of Norrell is directed to channel equalization and not the specific adjustment of bandedges of a broadband signal in response to a control signal (Br10-11). It is argued that the section for "Amplitude Distortion Compensation" is clearly indicated at column 9, lines 1-16, and this section teaches use of an upper bandedge filter (UBEF) and a lower bandedge filter (LBEF) to pass energy in a region centered at the respective upper and lower bandedges and to sharply attenuate the energy of a band between the upper and lower bandedges (RBr2). It is argued that column 9, lines 44-48, cited by the examiner, fails to support the examiner's allegation that the compensation of amplitude distortion occurs in the equalizer delay line because the equalizer delay line compensates for delay whereas the upper and lower bandedge filters perform the amplitude compensation, as described in column 9, lines 1-17 (RBr2-3). It is argued that column 9, lines 1-17, fails to teach

and, in fact, teaches away from amplitude adjustment of bandedges (RBr2). Appellant argues (RBr3):

> The amplitude equalization of a channel necessarily involves the adjustment of an entire frequency spectrum. Although the adjustment of the entire frequency spectrum may also affect the signal at the bandedge, there is no specifically identifiable step of adjusting the bandedges. Thus, the equalization of the channel, i.e., the entire frequency response, is clearly different and teaches away from the adjustment of amplitude of the bandedges of a broadband signal prior to bandedge filtering as recited in claims 1 and 12 of Applicants' invention.

Initially, the limitation of "adjusting the amplitudes of the bandedges" does not require adjusting the amplitudes only at the bandedges and does not distinguish over adjusting the amplitude at all frequencies, including at the bandedges. Appellant apparently admits (at RBr3) that Norrell teaches amplitude equalization of the channel which involves adjustment of the entire frequency spectrum including the bandedges. For example, Norrell discloses in the background (col. 2, lines 10-16):

> [T]he power envelope of a signal can be adversely affected by channel impairments, particularly amplitude and phase distortions at the band edges. To compensate for such impairments, many receiver designs include an adaptive equalizer which compensates for amplitude and phase distortion on the transmission channel in the data recovery path. (Emphasis added.)

This teaches amplitude equalization at the bandedges. Norrell discloses that "[prior art] equalization boosts the desired energy at the bandedges, but also boosts the unwanted energy near the bandedges" (emphasis added) (col. 9, lines 14-16), which also

teaches amplitude equalization at the bandedges. Norrell also discloses (col. 9, lines 44-48):

> [I]f the delay line is long enough to compensate for amplitude and delay distortion in general, it is long enough to compensate for the differential delay distortion at a particular pair of frequencies. (Emphasis added.)

This also teaches amplitude equalization at the bandedges. The amplitude (and delay) equalization is performed by TIF 504 and the receiver equalizer delay line 506, which receive coefficients (a control signal) form element 530. In addition, amplitude equalization of the channel, i.e., amplitude equalization across the entire frequency spectrum, was apparently known (specification, p. 2, lines 19-21). The section "Amplitude Distortion Compensation" at column 9, lines 1-16, teaches filtering with the upper and lower bandedge filters as an improvement to the prior art to remove unwanted energy in the center of the band caused by amplitude equalization which "equalization boosts the desired energy at the bandedges, but also boosts the unwanted energy near the bandedges" (emphasis added) (col. 9, lines 14-16) and does not teach away from amplitude adjustment of the bandedges. Thus, we find that Norrell anticipates the subject matter of claims 1 and 12. The rejection of claims 1 and 12 is sustained.

Claims 9, 10, 15, and 16

Claims 9 and 15 call for attenuating a particular bandedge in response to the control signal. Claims 10 and 16 call for amplifying a particular bandedge in response to the control signal. Appellant argues that Norrell fails to teach any adjusting of the amplitudes of the bandedges, much less the attenuation or amplification of a particular bandedge (Br11-15).

We previously found in connection with claims 1 and 12 that Norrell discloses amplitude equalization of the bandedges. Amplitude equalization means attenuating or amplifying to make the amplitudes equal. Therefore, we find that Norrell anticipates the subject matter of claims 9, 10, 15, and 16. The rejection of claims 9, 10, 15, and 16 is sustained.

CONCLUSION

The rejection of claims 1, 9, 10, 12, 15, and 16 is sustained.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

JAMES D. THOMAS
Administrative Patent Judge)

LEE E. BARRETT
Administrative Patent Judge) BOARD OF PATENT APPEALS AND INTERFERENCES

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